SMART HOME SECURITY APPLICATION

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ABSTRACT

Protection of our personal properties is a key challenge and prior responsibility every time which affects massively on a day-to-day life. The current system of achieving security has plenty of drawbacks and less secure. The main goal of implementing a home security and automation system is to achieve a powerful and more secure way to handle the day-to-day stuff preventing from misuse hands and keeping track of usage of home electrical appliances to know the necessary and unnecessary actions. The system is built on IoT (Internet of things) to make more accurate and error-free control over the flow of the system. To make the difference from the existing system, in this proposed system we built the communication of hardware devices with an application where devices take commands and operate it while application rise the commands and keeps track of each transaction made so far. The combination of hardware and software will make life easier and safer for its users.

INTRODUCTION

The home security system is an idea of lock/unlock and turn on/off devices of home appliances through using microcontroller NodeMCU ESP8266, fingerprint sensor, solenoid lock and web application, where it becomes more trustable and feel more secure. The direct benefit of this system is zero redundancy, no duplicate fingerprint access can happen, saving them time and cost. The system introduced to overcome the ongoing obstacles in theft crime issues where privacy becomes very important. The home security system can be done in the simplest ways with controlling devices with limited features like controlling doors with fingerprint sensors and other devices. The implementation of the home security and automation system is kept simpler towards the end-user front-end to make it more user-friendly and easier to adapt, where the back-end process makes more complex things from managing hardware and software. This idea is not only limited to home but also can be used in various areas like offices, banks, etc.

KEYWORD:- Security, Password, NODE MCU.

LITERATURE REVIEW

1.   Bluetooth based home automation system using cell phones: In Bluetooth based home automation system [2] the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system, the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.

2.   Zigbee based home automation system using cell phones: To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is recorded and stored by network coordinators for this the Wi-Fi network is used, which uses the four- switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. The message for security purpose first process by the virtual home algorithm and when it is declared safe it is re-encrypted and forwarded to the real network device of the home. Over Zigbee network [3], Zigbee controller sent messaged to the end. To reduce the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is helpful.

3.   GSM based home automation system using cell phones: Due to the mobile phone and GSM technology, the GSM based [4] home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM. The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analyzes all signals and converts them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTFC based on the command which is received by GSM module. The server application software can be accessed from internal network or from internet if the server has real IP on the internet using any internet navigator supports asp.net technology. Server application software is capable of maintaining the whole home automation system, setup and configuration. Server use database to keep log of home automation system components, we choose to use XML files to save system log.

4.   Wi-Fi based home automation system using cell phones: Wi-Fi based home automation system [5] mainly consist three modules, the server, the hardware interface module and the software package. The same technology uses to login to the server web-based application. The server is connected to the internet, so remote users can access server web-based application through the internet using

compatible web browser. Software of the latest home automation system is split to server application software and Microcontroller firmware. The server application software package for the proposed home automation system is a web-based application built using asp.net.

5.   Home automation using RF module:The important goal of Home Automation System is to build a home automation system using a RF controlled

6.   [6] remote. Now technology is accelerating so homes are also getting smarter.

Today traditional wall switches situated in various parts of the home makes it laborious for the end user to go near them to control and operate. Even further, it turns into more problematic for the old persons or physically handicapped people to do so. HomeAutomation using remote implements an easier solution with RF technology.In order to accomplish this, a RF remote is combined to the microcontroller on transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the loads can be turned ON/OFF globally using wireless technology.

7.   Cloud Based home automation system: Home Automation using cloud-based system focuses on design and implementation of home gateway to collect data from home appliances and then send to the cloud-based [7] data server to get store on Distributed File System, it is processed using Mapand used to implement a monitoring task to Remote user. Presently home Automation System is persistentlydeveloping its resilience by assimilating the current characteristicswhich gratify the rising interest of the people. The current system consists ofthree important units: the first part is cloud server, handle and controls the data and information of client and users and the status of devices. The hardware interface module is the second part which implements the relevant connection to the actuatorsand sensing devices which give thephysical service. Last part is HomeServer, which construct the hardware device and gives the user interface. The current system is cost efficient, reliable and comfortable which alsogives a secured home automationsystem for entire family.

8.   Raspberry pie-based home automation with wireless sensor:Home Automation System has been developed with Raspberry Pi [8] byreading the algorithm and subject of email. Raspberry Pi guarantees to be an efficient platform for implementation of powerful and economic smart home automation.Home automation using Raspberry pi is better than any other homeautomation methods in several ways. For example, DTMF (dual tone multi-frequency) using home automation, the call tariff is a big demerit, whichis not the problem in their proposed method. In Home Automation using web server, the design of web server and the memory space required is dismiss by this method because it just uses the already established web server service given by G-mail. LEDs were used to identify the switchingaction. This System is efficient andflexible. 8. Wireless Home Automation system using IoT: Thissystem uses mobiles or computers to control basic home control andfunction automatically through internet from anywhere around the world globally, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The proposed system is a distributed home automation system, consists of server i.e. Wi-Fi module, sensors. Server controls [9] and monitors the various sensors and can be easily configured to handle

more hardware interface module. The Arduino board, with built in Wi-Fi module acts as web server. Automation System [10] can be accessed from the web browser of anylocal PC using server IP or remotely from any PC or

mobile handheld device connected to the internet with appropriate web browser through server real IP. Wi-Fi technology is selected to be the network infrastructure that connects server and the sensors. Wi-Fi is chosen to improve system security and to increase system mobility and scalability.

OBJECTIVES

The purpose of this research project is to study and evaluate a suitable set to develop a smart door lock which is intended to offer high security, easy access, and control through constructing IoT system that includes the Smart Door Lock application. The specific research objectives are:

1.   Construct functional and secured system architecture.

2.   Develop an android application to serve as the user endpoint.

PROBLEM STATEMENT

The world nowadays look like is not safe place after all home security system is needed to discourage intruder and burglars. Installing home security is very important that might be a way that can give us the peace of mind that we all deserve. Home security system is just the perfect way to us to increase our overall sense of safety. Nowadays many types of security systems are available at the market such as biometric fingerprint security, face detection security, dynamic signature and many more. The security aspect is the highest concern of IoT connected entities. The data can be personal, enterprise or consumer. To reach an acceptable implementation for the smart door lock (SDL), security should be taken as a major challenge. This research solves the problem of setting up high and strong authentication between the user point entity (e.g Smartphone) and the API to generate an access token for the user that has privilege to unlock the door as well as provide strong privacy guarantees. To accomplish this goal, we need to decide on effective connection protocols can be used in the product and offers the ability to authenticate,

and access control, testify the local Wi-Fi network fulfil the security obligation, select the efficient microcontroller which satisfy the aims of the product by offering a secure IoT system and design and implement IoT architecture that can fit the aim of Smart Door Lock.

BLOCK DIAGRAM

PROPOSED METHODOLOGY(WORKING)

1.   The system uses NODEMCU microcontroller.
2.   It is selected since it has inbuilt Wi-Fi which is suitable for IoT Application.
3.   A 4 Channel Relay is used for automating 4 devices. It can be increased as per requirement.
4.   An Android App is developed using Kodular whileThingSpeak is used as cloud storage.
5.   A solenoid lock is connected for opening/closing of door automatically.
6.   The app has a feature of authentication using REST APIas well as fingerprint authentication to avoid security issues.

CIRCUIT DIAGRAM

HARDWARE & SOFTWAREREQUIREMENTS

Hardware Used1. NodeMCU

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.The term "NodeMCU" by defaultrefers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and builton the Espressif Non-OS SDK for ESP8266. It uses many open-sourceprojects,   such as   lua-cjson and SPIFFS.

➢ Microcontroller: Tensilica   32-bitRISC CPU Xtensa LX106

➢ Operating Voltage: 3.3V

➢ Input Voltage: 7-12V

➢ Digital I/O Pins (DIO): 16

➢ Analog Input Pins (ADC): 1

➢ UARTs: 1

➢ SPIs: 1

➢ I2Cs: 1

➢ Flash Memory: 4 MB

➢ SRAM: 64 KB

➢ Clock Speed: 80 MHz

➢ USB-TTL based on CP2102 is included onboard, Enabling Plug nPlay

➢ PCB AntennaQ

2. 5V Four Channel Relay

The **four-channel relaymodule** contains four 5V relays and the associated switching and isolating components, which makes interfacing with a microcontroller or sensor easy with minimum components and connections. The contacts on each relay are specified for 250VAC and 30VDC and 10A in each case, as marked on the body of the relays.

Specifications:

o Supply voltage – 3.75V to 6V

o Trigger current – 5Ma

o Current when the relay is active -
~70mA (single), ~300mA (all four)

o Relay maximum contact voltage –250VAC, 30VDC

o Relay maximum current – 10A

3. Solenoid Lock

The solenoid lock denotes a latch for electrical locking and unlocking. It is available in unlocking in the power-on mode type, and locking and keeping in the power-on mode type, which can be used selectively for situations. The power-on unlocking type enables unlocking only while the solenoid is powered on. Power Adapter

12V DC power supplies are one of the most common power supplies in use today. In general, a 12VDC output is obtained from a 120VAC or 240VAC input using a combination of transformers, diodes and transistors.

4. Zero PCB

Perfboard or Zero Pcb is a material for prototyping electronic circuits (also called DOT PCB). It is a thin, rigid sheet with holes pre-drilled at standard intervals across a grid, usually a square grid of 0.1 inches (2.54 mm) spacing. These holes are ringed by round or square copper pads, though bare boards are also available. Inexpensive perfboard may have pads on only one side of the board, while better quality perfboard can have pads on both sides (plate-through holes). Since each pad is electrically isolated, the builder makes all connections with either wire wrap or miniature point to point wiring techniques. Discrete components are soldered to the prototype board such as resistors, capacitors, and integrated circuits. The substrate is typically made of paper laminated with phenolic resin (such as FR-2) or a fiberglass- reinforced epoxy laminate (FR-4).

5. Male Header

Male pin headers are often associated with ribbon cable connectors. When used alone, they can be recipients of jumpers, which have spacings of 2.54 mm (0.1 in) and 2.00 mm (0.079 in). The spacing distance between pins (measured from center to center) is often known as pitch.

6. Female Header

The *female connector* is generally a receptacle that receives and holds the male *connector*.

7. Connecting Wires

Since stranded wire is more flexible than solid core wire of equal size, it can be used when the wire needs to move around frequently.

8. Jumper Wires

Jumper wires are simply wires thathave connector pins at each end, allowing them to be used to connect two points to each other withoutsoldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

USB

USB stands for Universal Serial Bus. It is used as a data cable for programming as well as for supplying power.

Software Used

Fritzing

Fritzing is an open-source hardware initiative that makes electronics accessible as a creative material for anyone. We offer a software tool, a community website and services in the spirit of Processing and Arduino, fostering a creative ecosystem that allows users to document their prototypes, share them with others, teach electronics in a classroom, and layout and manufacture professional pcbs.

Arduino IDE

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board. The source code for the IDE is released under the GNU General Public License, version. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a textfile in hexadecimal encoding that is loaded into the Arduino board by aloader program in the board's firmware.

ThingSpeak

According to its developers, "ThingSpeak is an open- source Internet of Things (IoT)application and API to store andretrieve data from things usingthe HTTP and MQTT protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates".

ThingSpeak was originally launchedby ioBridge in 2010 as a service in support of IoT applications.

ThingSpeak has integrated supportfrom the numerical computing software MATLAB from MathWorks,allowing ThingSpeak users to analyzeand visualize uploaded data using Matlab without requiring the purchaseof a Matlab license from Mathworks.

ThingSpeak has a close relationship with Mathworks, Inc. In fact, all of the ThingSpeak documentation is incorporated into the Mathworks' Matlab documentation site and even enabling registered Mathworks user accounts as valid login credentials on the ThingSpeak website. The terms of service and privacy policy of ThingSpeak.com are between the agreeing user and Mathworks, Inc.

ThingSpeak has been the subject ofarticles in specialized "Maker"websites
like Instructables, Codeproject, and Channel 9.

Kodular

Kodular (formerly Makeroid) is an open-source online suite for mobile app development. It has an innovative component and block design which provides a free drag-and-drop Android app creator without coding, based on MIT App Inventor.

CONCLUSION

This project presented is a low cost and flexible home control and monitoring system using Node MCU Board with internet and various sensors remotely controlled by Android OS smart phone. In this, Node MCU micro controller is used as an interface between user and hardware components. It is programmed and connected to several components according to the requirements. A micro web server is used as an application layer for communication between remote users and home devices, security systems. This entire system communication is enabled through internet. User can operate wirelessly. All these together forms a complete capable, flexible smart home control and monitoring system, based on IOT technology.

FUTURE SCOPE

More smartness can be added to this proposed project for making this smart home highly automated by using artificial intelligence. A camera can also be connected to micro controller so that suspect photograph can be taken and can be forwarded to the police if needed. Also voice call feature can be included to this system through which user can control the home appliances.

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